NON-PUBLIC?: N
ACCESSION #: 8809190134
LICENSEE EVENT REPORT (LER)

PAGE: 1 of 4

FACILITY NAME: H. B. Robinson Steam Electric Plant, Unit No. 2

DOCKET NUMBER: 05000261

TITLE: Automatic Reactor Trip Due To Turbine Trip From Turbine Overspeed Protection
EVENT DATE: 05/12/88 LER #: 88-011-01 REPORT DATE: 09/13/88

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Freddie L. Legette, Senior Reactor Operator

TELEPHONE #: 803-383-1253

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: TA COMPONENT: 0012 MANUFACTURER: W120

REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On May 12, 1988, at 1129 hours, with the reactor at 60 percent power, the Plant experienced an automatic turbine trip/reactor trip while surveillance testing of the Turbine Redundant Overspeed Trip System (TROTS) was in progress. The turbine trip was caused by a 2 out of 3 TROTS logic. Maintenance had placed one TROTS channel in test when a second channel spuriously actuated due to degraded insulation on its speed probe. The insulation has been repaired and the speed probe replaced. The NRC was notified of the trip pursuant to 10CFR50.72(b)(2)(ii). Subsequently, the licensee found that the periodic TROTS functional test and calibration procedures required by Technical

Specifications, Table 4.1-1, Item 28 have omitted the TROTS solenoid valves on the turbine stop and control valves. These solenoid valves were functionally tested on May 14, 1988 and will be tested on a monthly basis. Complete elimination of the TROTS is under evaluation. The reactor was returned to power operation at 0144 hours, May 15, 1988. This LER was originally submitted pursuant to 10CFR50.73(a)(2)(iv).

(End of Abstract)

I. DESCRIPTION OF EVENT

On Thursday, May 12, 1988, at 1129 hours, the Unit was operating at 60 percent power.(1,2) A Maintenance surveillance test procedure for the Turbine Redundant Overspeed Trip System (TROTS) was in progress at the time.(3) All preliminary checks to ensure no channel trip/failure signals were present had been completed. The licensee technician performing the test had placed the Channel 1 test selector in the "Overspeed Test" position, with two out of three Channels required for an overspeed trip signal. The turbine tripped automatically, resulting in an automatic reactor trip (power greater than 10%).

Subsequent investigation of the incident has revealed a separate but relevant condition. Plant Technical Specifications, Table 4.1-1, Item 28, requires periodic functional tests and calibration of the TROTS. This requirement includes functional operability testing of the TROTS redundant solenoid valves. The solenoid valves are designed to open on an overspeed condition and dump high pressure electro-hydraulic (E-H) fluid back into the E-H reservoir, allowing the governor, reheat, intercept, and stop valves to shut (i.e., turbine trip). However, it was discovered that the procedures implemented to conduct the surveillance tests and calibration have omitted these solenoid valves.

The licensee notified the NRC via the Emergency Notification System on May 12, 1988, of the trip pursuant to 10CFR50.72(b)(2)(ii).

II. CAUSE OF EVENT

The insulation on two of the three speed probes for TROTS degraded in time due to oil impingement to the speed probe leads from the turbine-generator bull gear. The probes are located adjacent to the rotating bull gear teeth to sense turbine-generator speed. This degradation apparently resulted in Channel-2 intermittent signals which, when coupled with the overspeed test signal inserted by the technician, satisfied the turbine trip logic, i.e., two out of three overspeed signals present initiates an automatic turbine

trip.

The TROTS logic is tested on a monthly basis and the speed channels are calibrated on a refueling basis. The actuation of the solenoids was never included in the surveillance procedure due to a misinterpretation of the Technical Specifications functional testing requirement. Documentation of the 1970 change to the Plant Technical Specifications which incorporated TROTS requirements into Table 4.1-1, "Minimum Frequencies for Checks, Calibrations, and Test of Instrument Channels," is not conclusive enough to

(1) H. B. Robinson Steam Electric Plant, Unit No. 2 is a Westinghouse 700 megawatt Pressurized Water Reactor power plant, in commercial operation since March 1971.
(2) Plant Technical Specifications Amendment No. 115 limited reactor power to 1380 megawatts thermal.
(3) MST-552, Revision 3, Turbine Redundant Overspeed Trip System Testing.

II. CAUSE OF EVENT (Continued)

determine precisely why the solenoid testing requirement was misinterpreted. An independent review of surveillance tests conducted during 1982 did not identify this testing inadequacy apparently due to the backfit nature of the system and the unavailability of detailed background and design information at the time.

III. ANALYSIS OF EVENT

The Engineered Safety Features and Reactor Protection System performed as designed. At no time did the Plant operate in an unsafe condition. This event is reportable as a condition that resulted in an automatic actuation of a reactor trip.

Although the TROTS surveillance procedures did not provide a complete functional test regarding the actuating solenoids, the fact that the spurious trip signal was successful on May 12 demonstrated that the system was functional. The solenoids are redundant with two installed on each of fourteen turbine valves. It is therefore unlikely that inadequate surveillance testing would have prevented the TROTS from performing its intended function, i.e., preventing overspeed of the turbine generator.

The TROTS is, as titled, a redundant overspeed trip system to assure an overspeed trip. It is redundant to a mechanical overspeed device on the turbine and an electrical overspeed protection controller located in the E-H control system. TROTS was initially installed in resolution of an original

licensing issue regarding turbine missiles. However, the licensee has since replaced the original low pressure turbine rotors with fully integral turbine rotors and the continued need for TROTS is under evaluation.

IV. CORRECTIVE ACTIONS

Maintenance has repaired the insulation and replaced the TROTS speed probes. An oil shield has been installed to protect the speed probes by minimizing the potential for oil from the turbine bull gear from damaging the wiring.

The TROTS system is presently being evaluated to determine if the system is currently required. A Special Procedure was developed to test the solenoids. The Plant was taken off-line on June 19, 1988, and this test was performed satisfactorily. The 28 solenoids previously scheduled for monthly testing have been re-evaluated by the vendor and the Licensee. This evaluation concluded that, based on the TROTS design, only the 12 solenoids that are associated with the turbine stop and governor valves should be tested at power. The Operations Surveillance test procedure was revised and the 12 solenoids that are associated with the stop and governor valves were tested satisfactorily at power on July 16, 1988.(4) A permanent test procedure has been developed to test the reheat and intercept valve solenoids at refueling intervals as recommended by the vendor.(5)

(4) OST-551, Revision 8, Turbine Valve and Trip Functional Test.
(5) MST-554, Revision 0, Turbine Redundant Overspeed Trip System Solenoid Testing.

V. ADDITIONAL INFORMATION

A. Failed Component Identification

Unit Pickup No. EC724114, for TROTS.

B. Previous Similar Events

There have been two prior TROTS turbine trips: June 20 and July 21, 1973.

CP&L
Carolina Power & Light Company
ROBINSON NUCLEAR PROJECT DEPARTMENT

POST OFFICE BOX 790
HARTSVILLE, SOUTH CAROLINA 29550
SEP 13 1988

Robinson File No: 13510C Serial: RNPD/88-3519
(10 CFR 50.73)

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261
LICENSE NO. DPR-23
LICENSEE EVENT REPORT 88-011-01

Gentlemen:

The enclosed Supplemental Licensee Event Report (LER) is submitted in accordance with 10 CFR 50.73 and NUREG-1022 including Supplements No. 1 and 2. This information provides supplemental information regarding event cause and clarifies corrective action based on subsequent vendor information. The revised portions are indicated by a righthand margin bar. This submittal should replace existing copies of the original report of June 11, 1988.

Very truly yours,
/s/ D. R. Quick for
R. E. Morgan
General Manager
H. B. Robinson S. E. Plant

FLL:jch

Enclosure

cc: Dr. J. N. Grace
Mr. L. W. Garner
INPO

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